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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/870,243	05/30/2001	Robert L. Brainard	50540	8839
21874	7590	09/19/2006	EXAMINER	
EDWARDS & ANGELL, LLP			LEE, SIN J	
P.O. BOX 55874			ART UNIT	
BOSTON, MA 02205			PAPER NUMBER	

1752

DATE MAILED: 09/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/870,243

Applicant(s)

BRAINARD ET AL.

Examiner

Sin J. Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 22-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 22-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application
- ☐ Other: _____.

DETAILED ACTION

1. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 22-29, 31 and 33-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US 6,303,263 B1).

Chen et al teaches a chemically amplified resist system that comprises a dual blocked polymer resin and a photoacid generator (see abstract). Specifically, in Example 7, Chen teaches a resist composition containing a dual blocked terpolymer comprising hydroxystyrene, t-butyloxycarbonyloxystyrene, and methoxycyclohexane protected hydroxystyrene (which is a *ketal* protected hydroxystyrene) and a photoacid generator (di(t-butylphenyl)iodonium *perfluorooctane sulfonate*). Chen also teaches

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(col.6, lines 39-40) that his photoacid generator can be present in the amount of 0.005 to 10 wt.%. The higher end of this range taught by Chen is close enough to the lower end of present range of 11-15 wt% and to the lower end of present range of *at least about 12 wt%* that one skilled in the art would have expected them to have the same properties. Thus, the prior art's teaching of 10 wt% would render present ranges of claims 22 and 23 *prima facie* obvious. Where the claimed ranges and prior art do not overlap but are close enough that one skilled in the art would have expected them to have the same properties, a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, In re Titanium Metals Corporation of America v. Banner, 227 USPQ 773 (Fed. Cir. 1985). Also, Chen teaches (col.5, lines 41-47) that imaging of his resist can be done with mid-UV, deep UV, *extreme-UV*, e-beam, X-ray. Since there are only several choices given by Chen, it would have been obvious to one skilled in the art to use extreme-UV as the light source with a reasonable expectation of obtaining a resist pattern of high resolution. Therefore, Chen's teaching would render obvious present inventions of claims 22-24, 26-28, 31, 33 and 34.

With respect to present claim 25, Chen also teaches that nitrobenzyl compounds can be used as his photoacid generator (see col.5, lines 31-35). Therefore, Chen's teaching renders obvious present invention of claim 25.

With respect to present claim 29, Chen also discloses a terpolymer which is made by partially protecting phenols of hydroxystyrene-*t-butylacrylate* copolymer with methoxycyclohexanyl group (a ketal group) in his Example 5. Therefore, Chen's teaching renders obvious present invention of claim 29.

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With respect to present claims 35-37, Chen also teaches that his composition can contain basic compounds (col.2, lines 54-62 and col.6, lines 13-19). Therefore, Chen's teaching renders obvious present inventions of claims 35-37.

4. Claims 22-30 and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fedynyshyn (US 6,783,914 B1).

Fedynyshyn teaches (see claim 1) a positive photosensitive resist composition containing a resin binder and an encapsulated inorganic material. As the resin binder, Fedynyshyn teaches (see claim 4) a terpolymer of polyvinylphenol, t-butyl acrylate and styrene. Fedynyshyn also teaches the use of 0.5-20 wt.% of photoacid generator which examples include diphenyliodonium triflate as well as 2,6-nitrobenzylester compounds (see col.11, lines 63-67, col.12, lines 1-22). After applying a layer consisting of his positive photoresist to a substrate, Fedynyshyn exposes the coating with radiation and then develops the expose coating to remove the exposed areas (see col.17, lines 7-12). Fedynyshyn teaches (col.3, lines 15-20) that EUV can be used as the light source. The range of 0.5-20 wt.% for Fedynyshyn's photoacid generator overlaps with present ranges of claims 22 and 23. Therefore, the prior art's range would have made present ranges *prima facie* obvious. In the case "where the [claimed] ranges overlap or lie inside ranges disclosed by the prior art," a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, Fedynyshyn's teaching renders obvious present inventions of claims 22-30 and 32-34.

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5. Claims 22-30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (6,103,447).

Chen teaches (col.1, lines 7-17, col.3, lines 3-12, lines 15-22) a positive tone chemically amplified resist system for use in mid-UV, deep-UV, **extreme UV**, X-ray, and e-beam lithography comprising (a) a polymer resin composition (a blend of at least two miscible aqueous base soluble polymer resins, one of which is partially protected with a high activation energy protecting group and the other of which is partially protected with a low activation energy protecting group), (b) acid generator, and (c) a solvent. As the polymer resin protected with a high activation energy protecting group, Chen teaches, for example in Example 5, a terpolymer of *hydroxystyrene*, *styrene*, and *tertiary butyl acrylate*. Chen teaches (col.7, lines 10-14) that his chemically amplified resist system preferably comprises from about 0.005 to about 10 wt% of the acid generator. *Since 10 wt% is clearly disclosed in the reference as the higher limit of the range*, one of ordinary skill in the art would immediately envisage using 10 wt% of the acid generator in Chen's chemically amplified resist system. The amount of 10 wt% taught by Jung is close enough to the lower end of present range of 11-15 wt% in claim 22 and to the lower end of present range of *at least about 12 wt%* in claim 23 that one skilled in the art would have expected them to have the same properties. Thus, the prior art's teaching of 10 wt% would render present ranges of claims 22 and 23 *prima facie* obvious. Where the claimed ranges and prior art do not overlap but are close enough that one skilled in the art would have expected them to have the same properties, a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results,

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In re Titanium Metals Corporation of America v. Banner, 227 USPQ 773 (Fed. Cir. 1985). Although in Example 5, Chen exposes his resist film to DUV light, since Chen clearly states that his chemically amplified resist system is for use in mid-UV, deep-UV, **extreme UV**, X-ray, and e-beam lithography (and since there are only a few alternatives of light source listed), it would have been obvious to one of ordinary skill in the art to expose Chen's resist coated on the silicon wafer to extreme UV with a reasonable expectation of obtaining a pattern with high resolution. Chen also teaches the use of a photoacid generator such as nitrobenzyl compounds and onium salts (col.6, lines 1-13) (such as di(t-butylphenyl)iodonium perfluorooctane sulfonate used in Example 5). Chen also teaches the use of a base such as t-butyl ammonium hydroxide (see Example 5). Therefore, Chen's teaching renders obvious present inventions of claims 22-30 and 32.

Response to Arguments

6. Applicants argue that Chen et al'263 or Chen et al'447 teaches against the cited top end value of 10 wt.% for its photoacid generator because their examples disclose much lower values of photoacid generators. Applicants also argue that those references provide no examples of exposing his photoresist to EUV radiation to form a relief image. Applicants also argue that Fedynshyn'914 does not exemplify the use of the photoacid generator compounds or the exposure with EUV radiation.

However, in In re Mills and Palmer 176 USPQ 196, it was held that non-preferred embodiments cannot be ignored, and even if the non-preferred embodiments are used, obviousness exists. Patentee, in the same manner as applicant, it not limited in his teachings to only the exemplified subject matter. As discussed above, since Chen (both

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of the references) teaches that his photoacid generator can be present in the amount of 0.005 to 10 wt.%, and since the higher end of this range is close enough to the lower end of present range of 11-15 wt%, the prior art's teaching of 10 wt% would render present ranges of claims 22 and 23 *prima facie* obvious. Where the claimed ranges and prior art do not overlap but are close enough that one skilled in the art would have expected them to have the same properties, a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, See In re Titanium Metals Corporation of America v. Banner, supra. Also, since Chen teaches that imaging of his resist can be done with mid-UV, deep UV, *extreme-UV*, e-beam, X-ray, and since there are only several choices given by Chen, it would have been obvious to one skilled in the art to use extreme-UV as the light source with a reasonable expectation of obtaining a resist pattern of high resolution. Also, since Fedynyshyn teaches the use of 0.5-20 wt.% of photoacid generator, and since Fedynyshyn teaches that EUV can be used as the light source, Fedynyshyn's teaching renders obvious present inventions.

Applicants also argue that previously filed 132 Declaration of Brainard shows unexpectedly superior results of present invention. However, ***as previously indicated***, Brainard's Declaration was found to be unpersuasive for those reasons ***already discussed*** in the previous Final Office action of April 14, 2005.

For the reasons stated above, present rejections still stand.

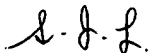
7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333.

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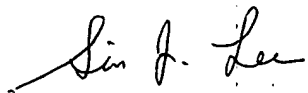
The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



S. Lee
September 16, 2006


SIN LEE
PRIMARY EXAMINER